The Effects of a Polymorphism in the CYP1A2 Gene on Serum Caffeine Concentrations during Exercise

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Research has demonstrated that a polymorphism in the cytochrome P450 (CYP1A2) gene impacts caffeine metabolism. Further, one recent study reported that performance enhancement with caffeine treatment differs across genotypes. **PURPOSE:** The purpose of the present study was to examine the effects of a polymorphism in the cytochrome P450 (CYP1A2) gene on circulating caffeine concentrations during exercise. **METHODS:** Twenty young (27 ± 3 years), novice cyclists (VO_{2max} = 31.7 ± 6.8) participated in three separate laboratory sessions. During the first visit, subjects underwent a graded exercise test on a Lode Corival cycle ergometer to determine VO_{2max}. Venous blood samples were collected and immediately analyzed for genotype (AA genotype vs. C variant) via polymerase chain reaction and gel electrophoresis. For the next two visits, 3 pieces of chewing gum (CAFF vs. PLA) was administered in a counterbalanced, double blind manner. Subjects remained resting for 10 min then completed a standard warm up on the cycle ergometer. Following the warm up, subjects cycled at 70% VO_{2max} (constant Wattage) for 15 min, rested for 10 min, then completed a 15 min performance ride. Venous blood samples were collected at baseline (Base), during the warm-up (+25), and immediately before (+50) and after (+65) the performance ride. Serum samples were analyzed for caffeine concentrations via High Performance Liquid Chromatography. **RESULTS:** Ten subjects possessed the AA genotype and 10 subjects possessed the C allele variant. Serum caffeine data were analyzed using a 2 (Genotype) by 4 (Time) analysis of variance (ANOVA). The ANOVA demonstrated a main effect of time ($p < 0.001$) across both genotypes. Post hoc comparisons demonstrated that caffeine concentrations increased from Base to +25 (1.4 ± .64 vs. 2.4 ± 1.1 mg · L^{-1} respectively, $P < 0.01$) and from +25 to +50 (2.4 ± 1.1 vs. 3.2 ± 1.5 mg · L^{-1}, respectively, $P = 0.012$) then remained stable from +50 to +65 (3.2 ± 1.5 vs. 2.6 ± 1.2 mg · L^{-1}, respectively, $P = 0.380$). No main effect of group was evident ($p = 0.970$). Further, no genotype x time interaction was evident ($p = 0.380$). **CONCLUSION:** These data suggest that the cytochrome P450 (CYP1A2) gene polymorphism did not impact circulating caffeine concentrations during acute exercise.